FIG.1

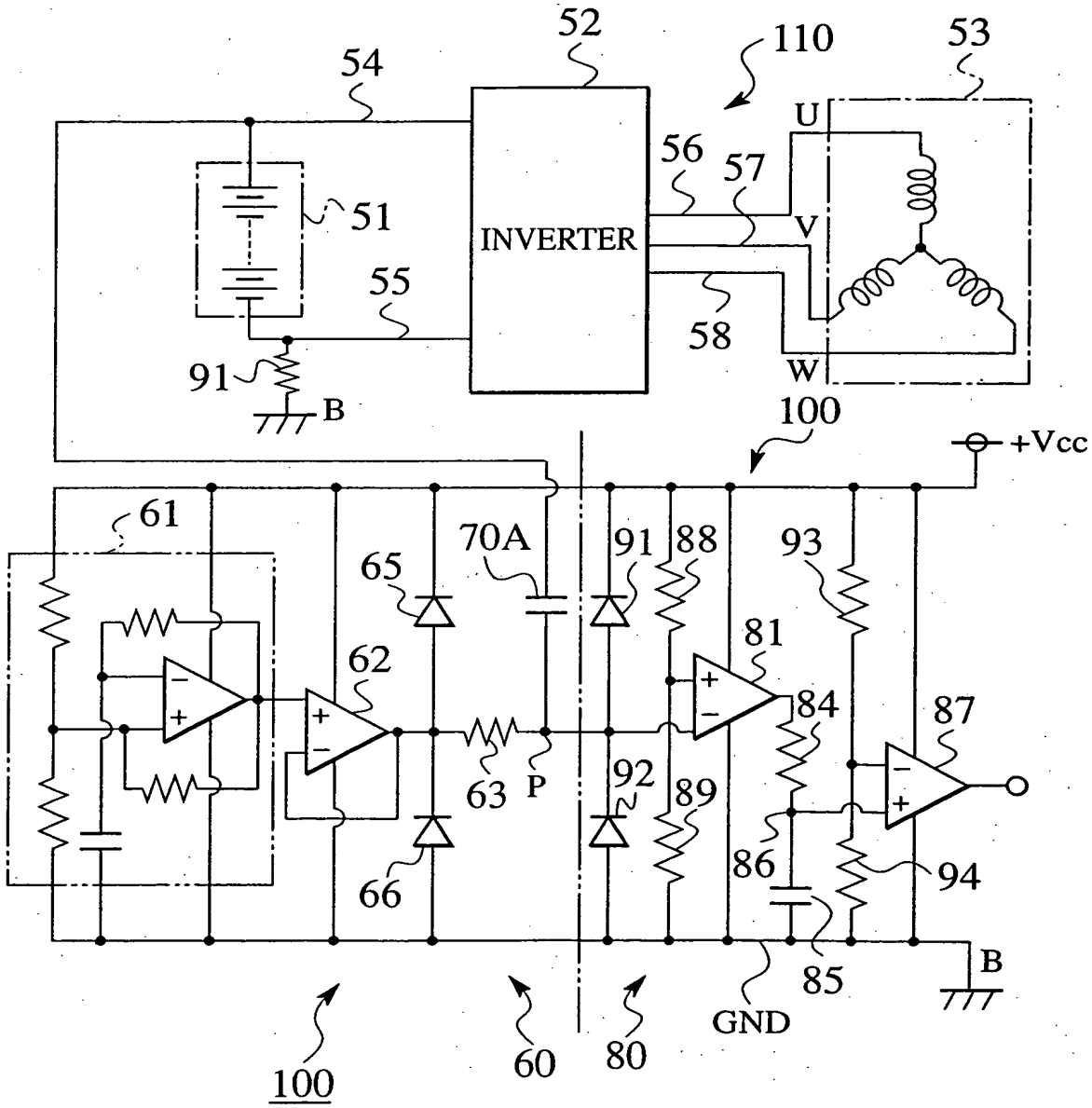
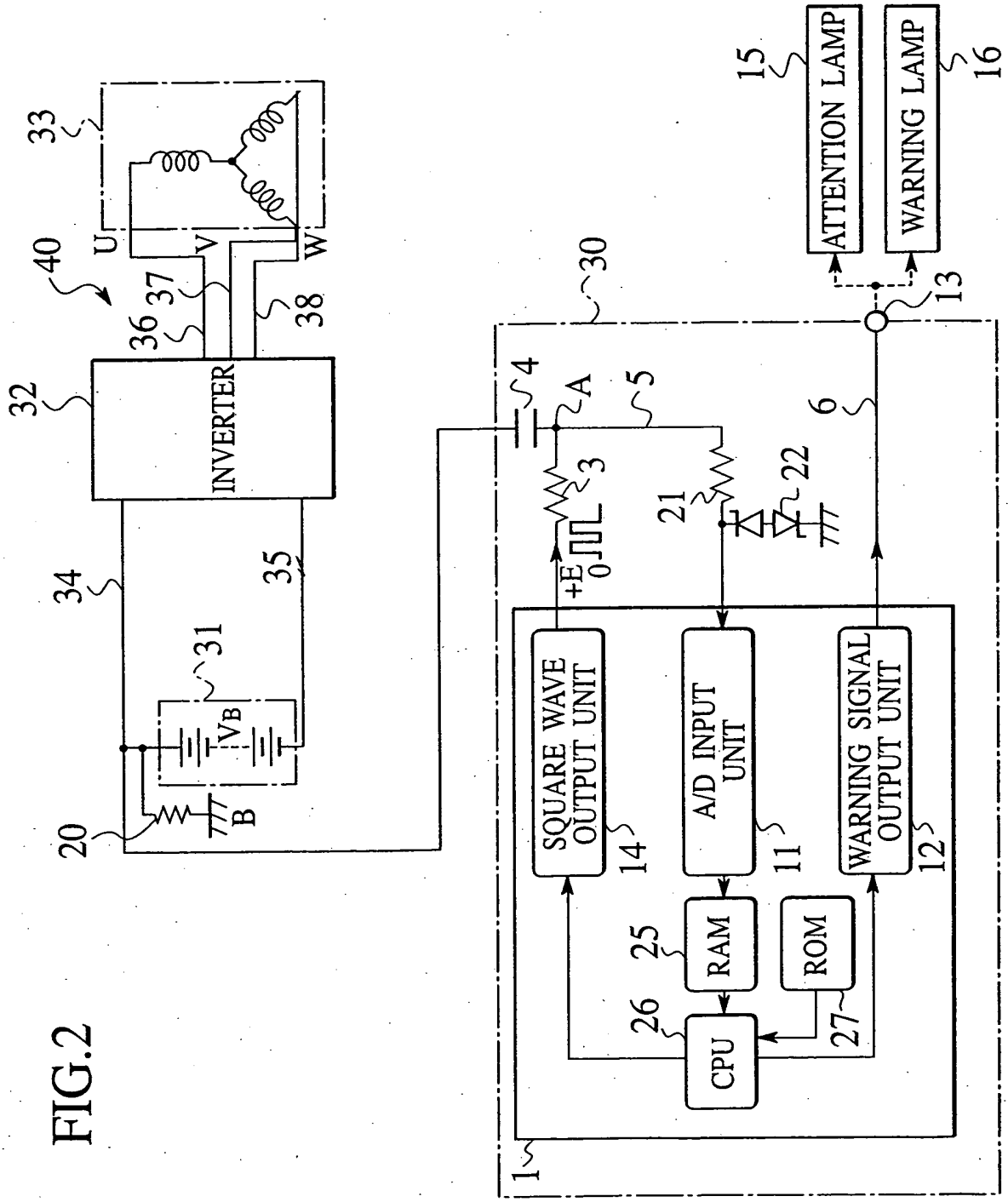

52
110
53
54
U
56
57
51
INVERTER
V
55
58
91
B
W
100
+Vcc
61
70A
91
88
93
65
81
62
84
87
63
P
92
89
66
86
94
85
B
GND
100
60
80

FIG.2


33
U
V
W
40
37
36
38
32
INVERTER
34
35
31
V_B
B
20
15
ATTENTION LAMP
16
WARNING LAMP
30
13
4
A
5
6
3
21
22
$+E_0$
SQUARE WAVE OUTPUT UNIT
14
A/D INPUT UNIT
11
WARNING SIGNAL OUTPUT UNIT
12
RAM
25
ROM
27
CPU
26
1

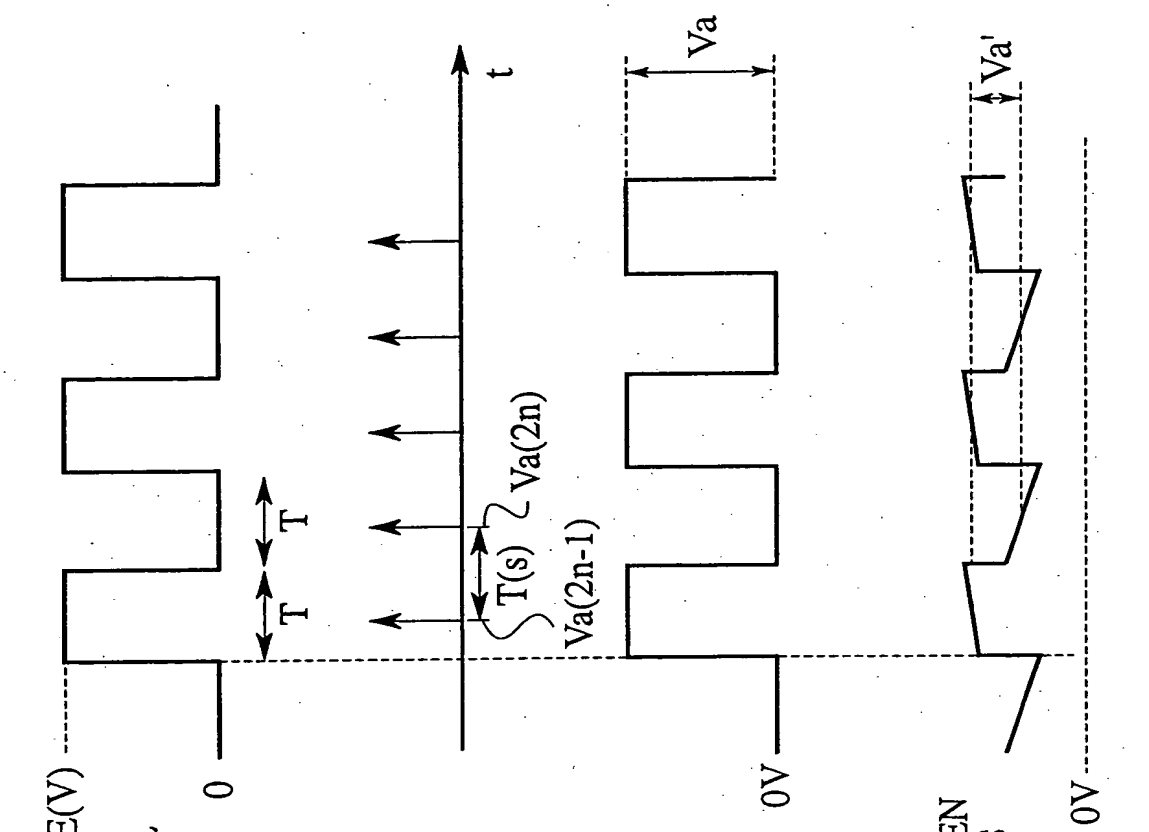

(a) GROUND DETECTION SIGNAL
E(V)
0
T
T
(b) SAMPLING PERIOD
t
T(s)
Va(2n)
Va(2n-1)
(c) A/D INPUT WAVEFORM IN NORMAL STATE
Va
0V
(d) A/D INPUT WAVEFORM WHEN INSULATION RESISTANCE IS DETERIORATED
Va'
0V

FIG.3

FIG.4

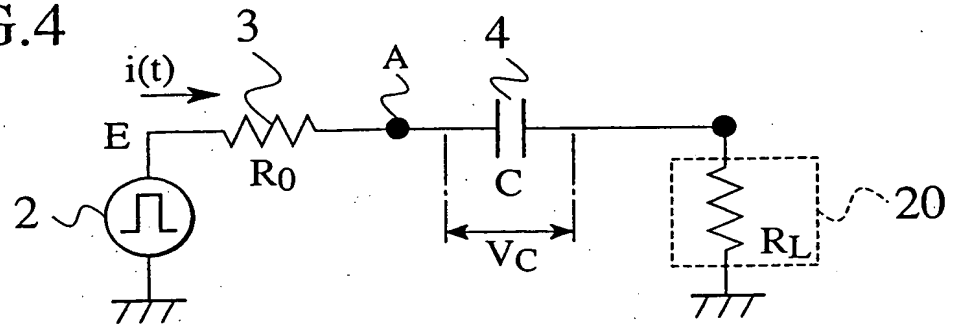


FIG.5

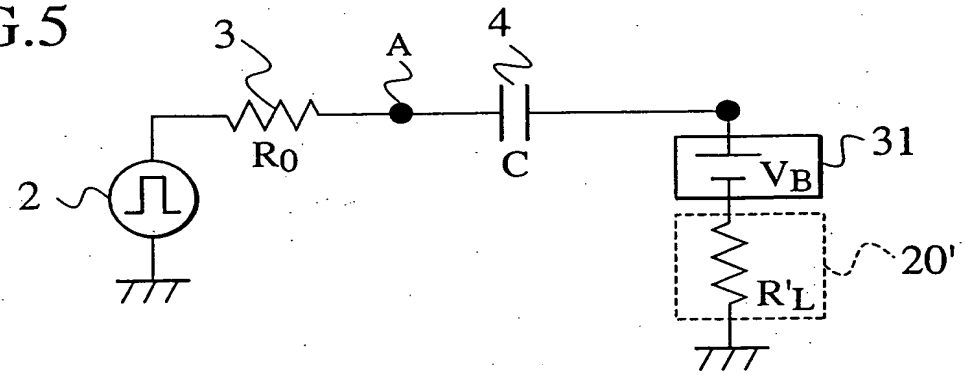


FIG.6

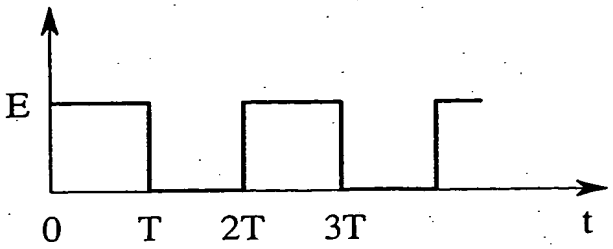


FIG.7

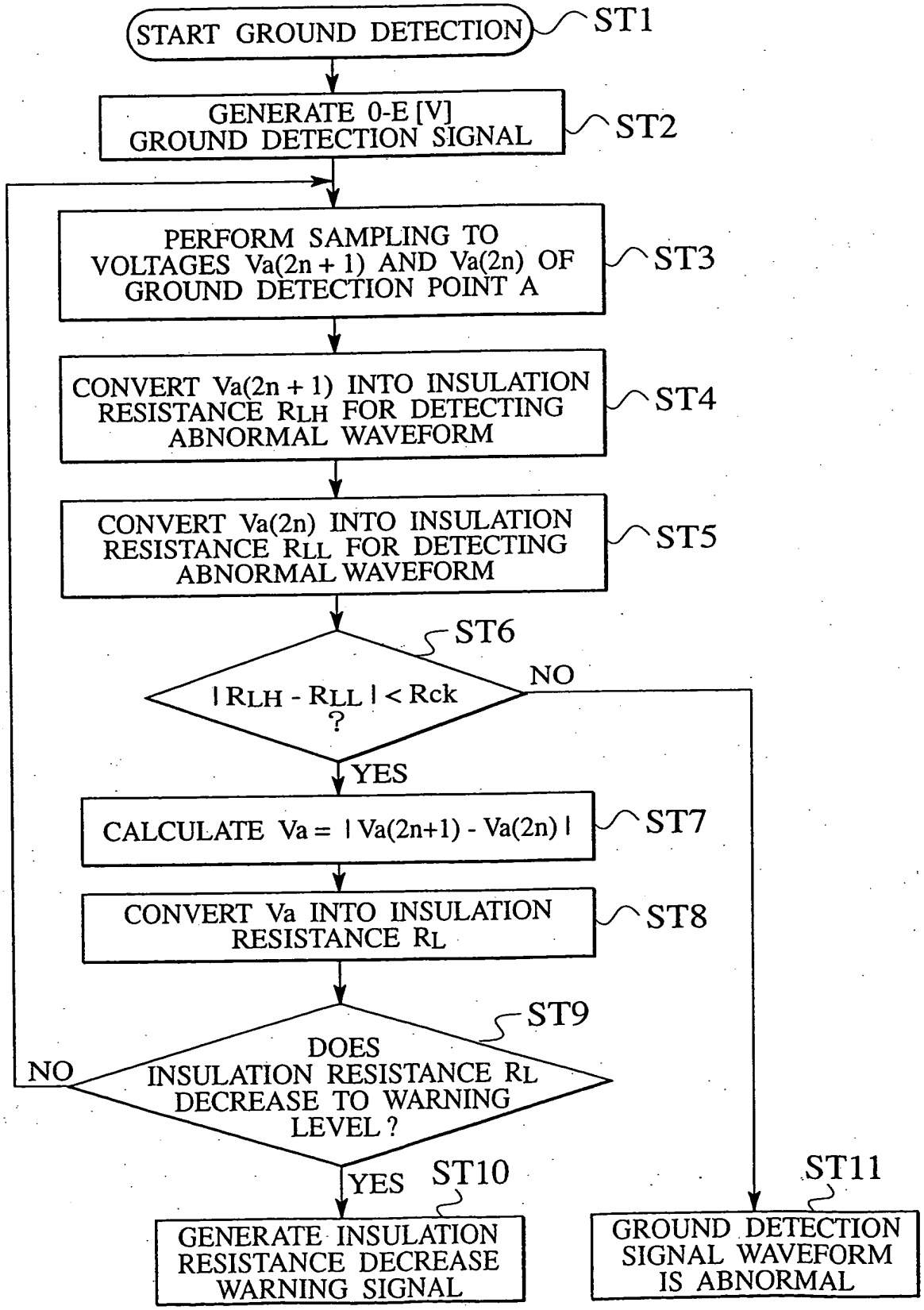

START GROUND DETECTION
ST1
GENERATE 0-E [V] GROUND DETECTION SIGNAL
ST2
PERFORM SAMPLING TO VOLTAGES Va(2n + 1) AND Va(2n) OF GROUND DETECTION POINT A
ST3
CONVERT Va(2n + 1) INTO INSULATION RESISTANCE RLH FOR DETECTING ABNORMAL WAVEFORM
ST4
CONVERT Va(2n) INTO INSULATION RESISTANCE RLL FOR DETECTING ABNORMAL WAVEFORM
ST5
ST6
| RLH - RLL | < Rck ?
NO
YES
CALCULATE Va = | Va(2n+1) - Va(2n) |
ST7
CONVERT Va INTO INSULATION RESISTANCE RL
ST8
ST9
DOES INSULATION RESISTANCE RL DECREASE TO WARNING LEVEL ?
NO
YES
ST10
GENERATE INSULATION RESISTANCE DECREASE WARNING SIGNAL
ST11
GROUND DETECTION SIGNAL WAVEFORM IS ABNORMAL

FIG.8

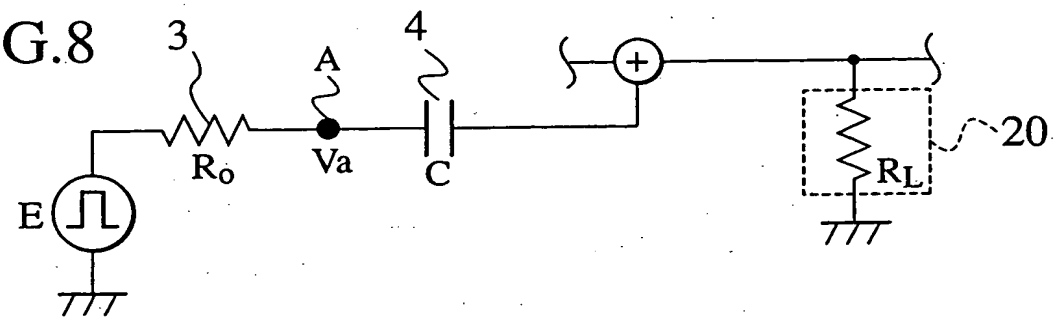


FIG.9

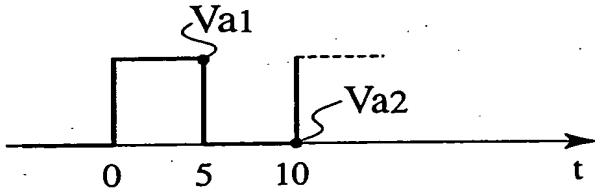


FIG.10

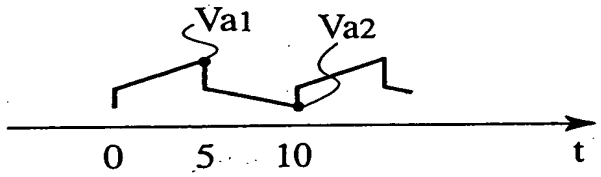


FIG.11

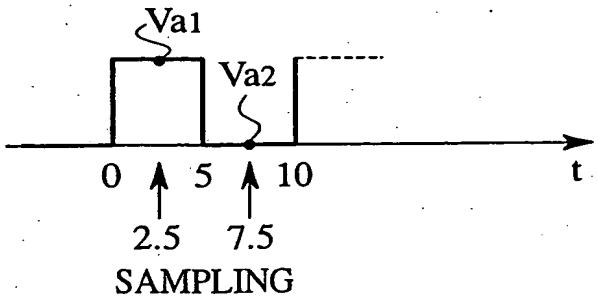
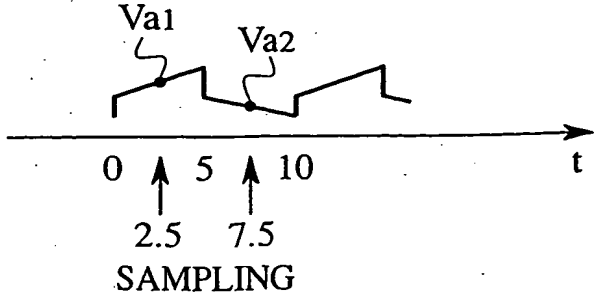



FIG.12